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Lin

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(54) **SPANNER WITH TORSION SPRING**

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(51) **Int. Cl.**[7] **B25B 13/28**

(52) **U.S. Cl.** **81/99**

(58) **Field of Search** 81/99, 111, 97, 81/103

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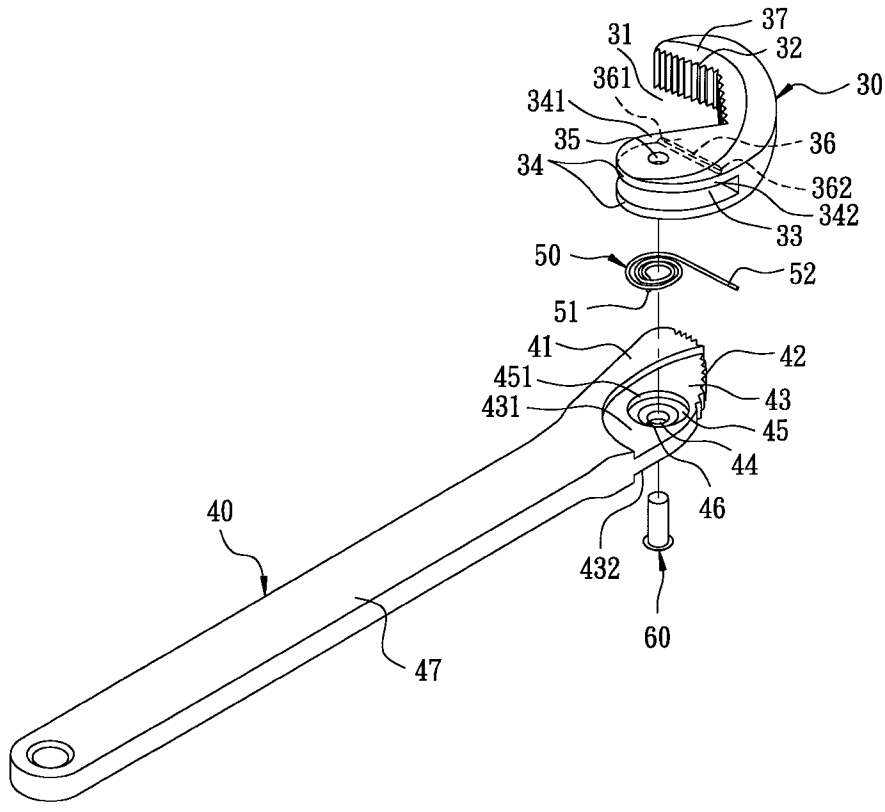
(57) **ABSTRACT**

A spanner includes first and second clamping members. The first clamping member has a handle portion and a first jaw portion with a pivot plate portion that has a first pivot hole formed through top and bottom surfaces thereof. The second clamping member has a second jaw portion and a pair of pivot lobes which cooperatively define a receiving space therebetween to permit the pivot plate portion to extend thereinto and which are formed with second pivot holes aligned axially with the first pivot hole. A pivot shaft extends through the first and second pivot holes for mounting pivotally the second clamping member on the first clamping member. A torsion spring is sleeved on the pivot shaft, and is disposed in the receiving space for biasing the second jaw portion to move toward the first jaw portion. One of the top and bottom surfaces of the pivot plate portion is formed with a recess confining wall that defines a recess around the first pivot hole for receiving the torsion spring so that the torsion spring is concealed by the recess confining wall. The receiving space has a width which is measured between confronting inner surfaces of the pivot lobes and which is substantially equal to the thickness of the pivot plate portion measured between the top and bottom surfaces of the pivot plate portion.

3 Claims, 9 Drawing Sheets



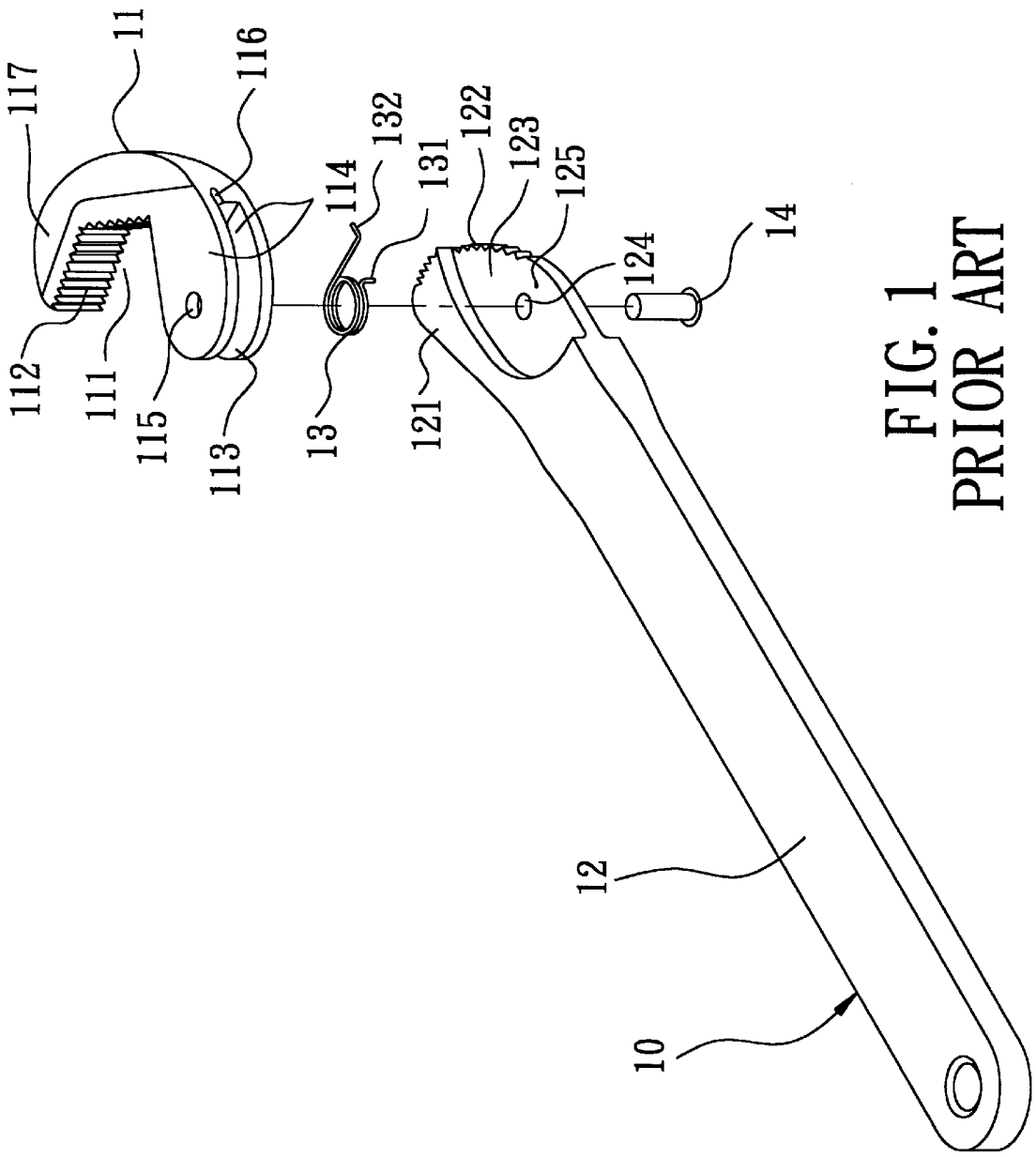


FIG. 1
PRIOR ART

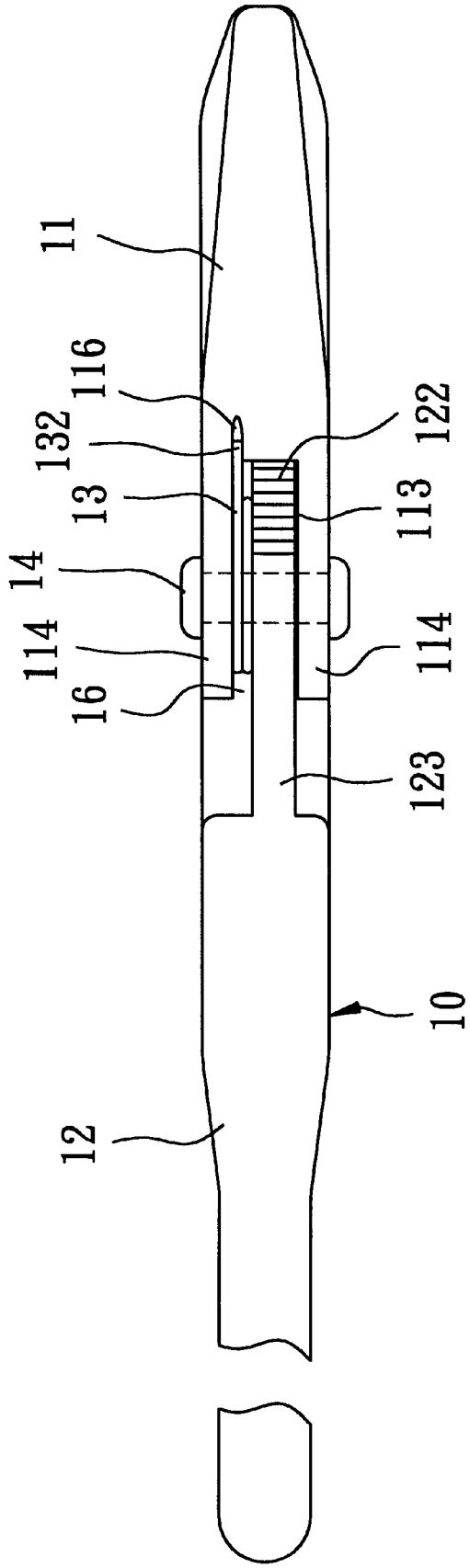


FIG. 2
PRIOR ART

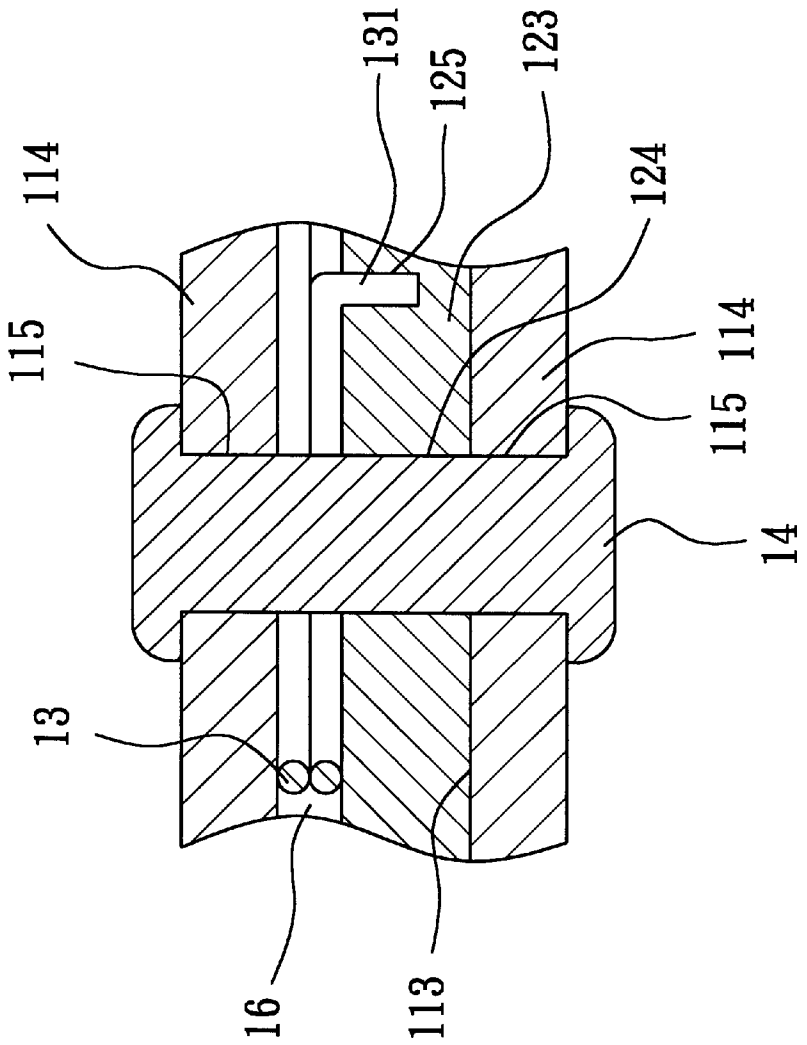


FIG. 3
PRIOR ART

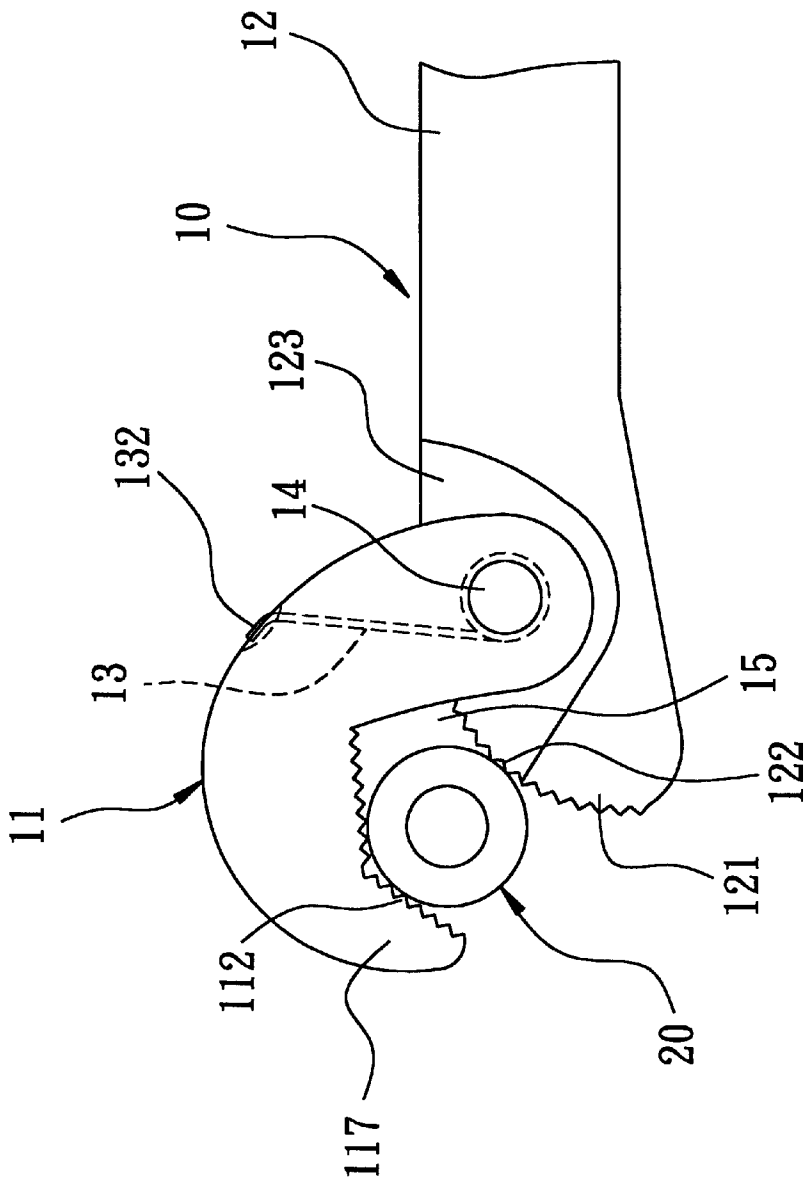
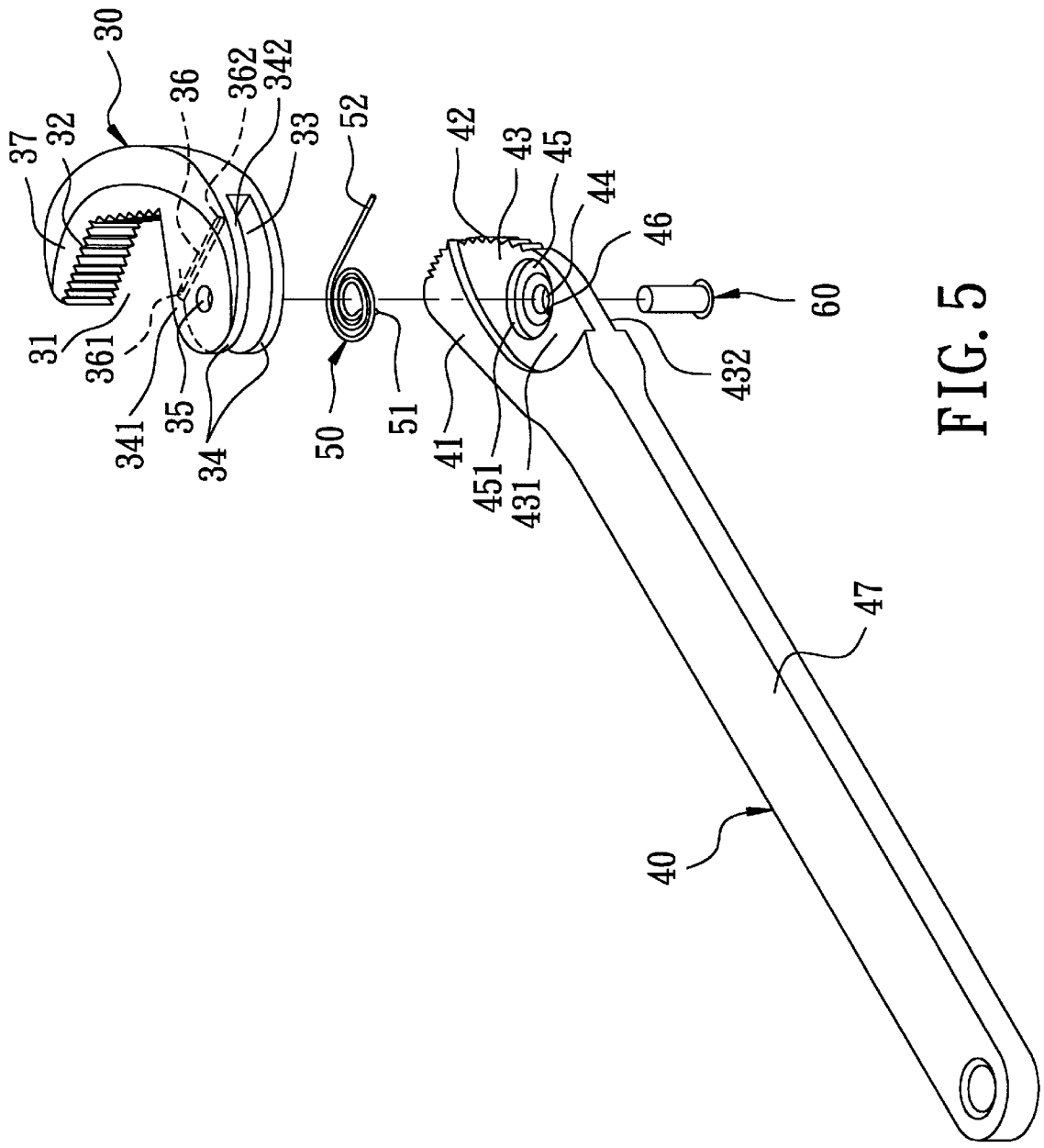


FIG. 4
PRIOR ART


30
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342
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43
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60
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451
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40

FIG. 5

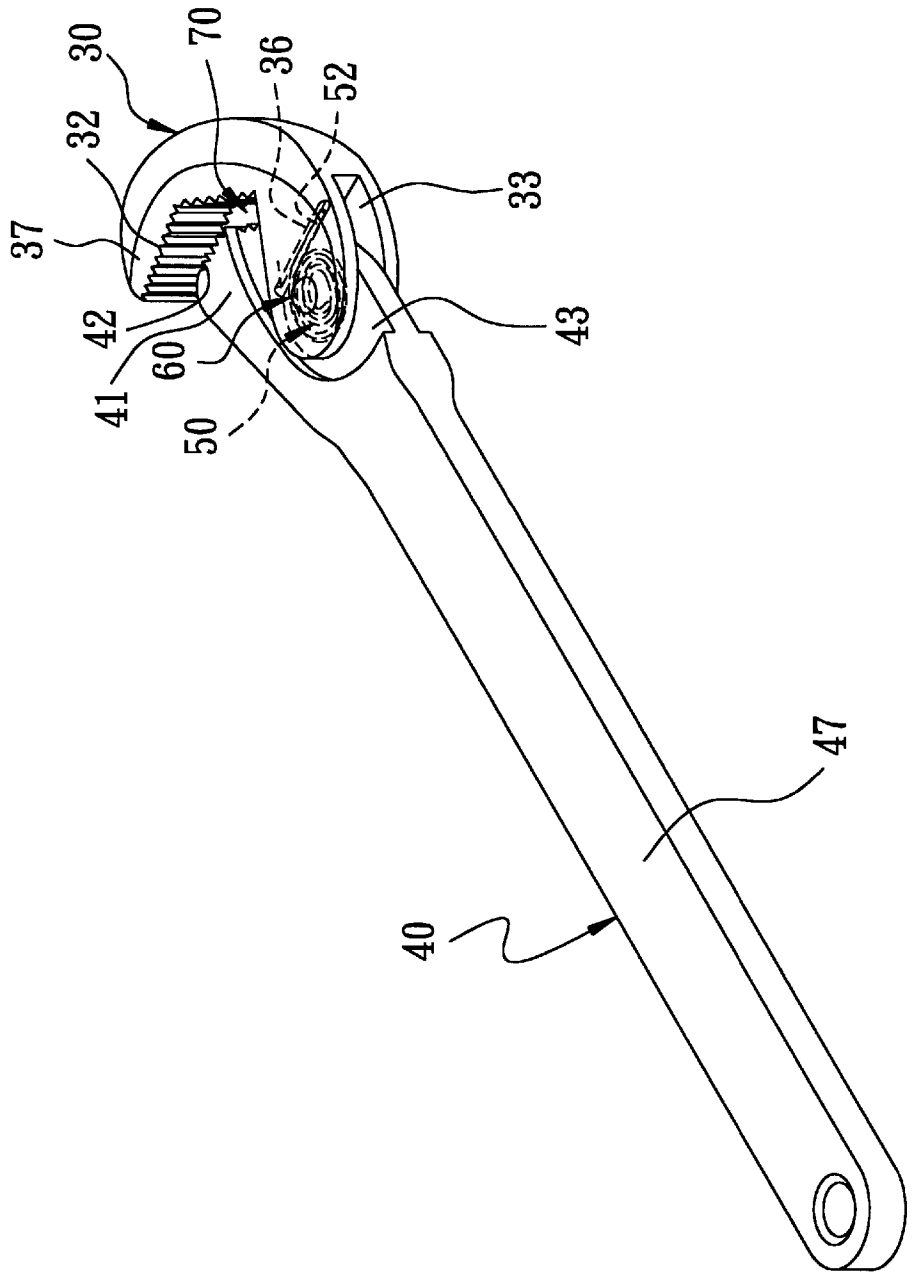

FIG. 6

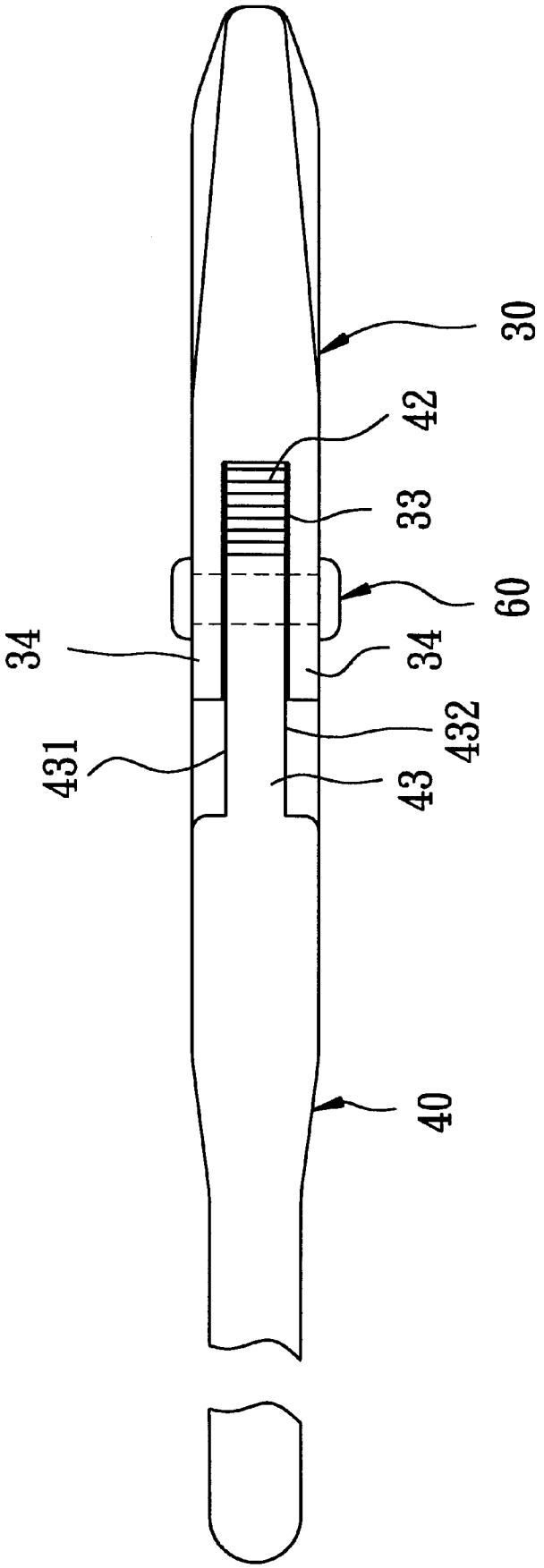

FIG. 7

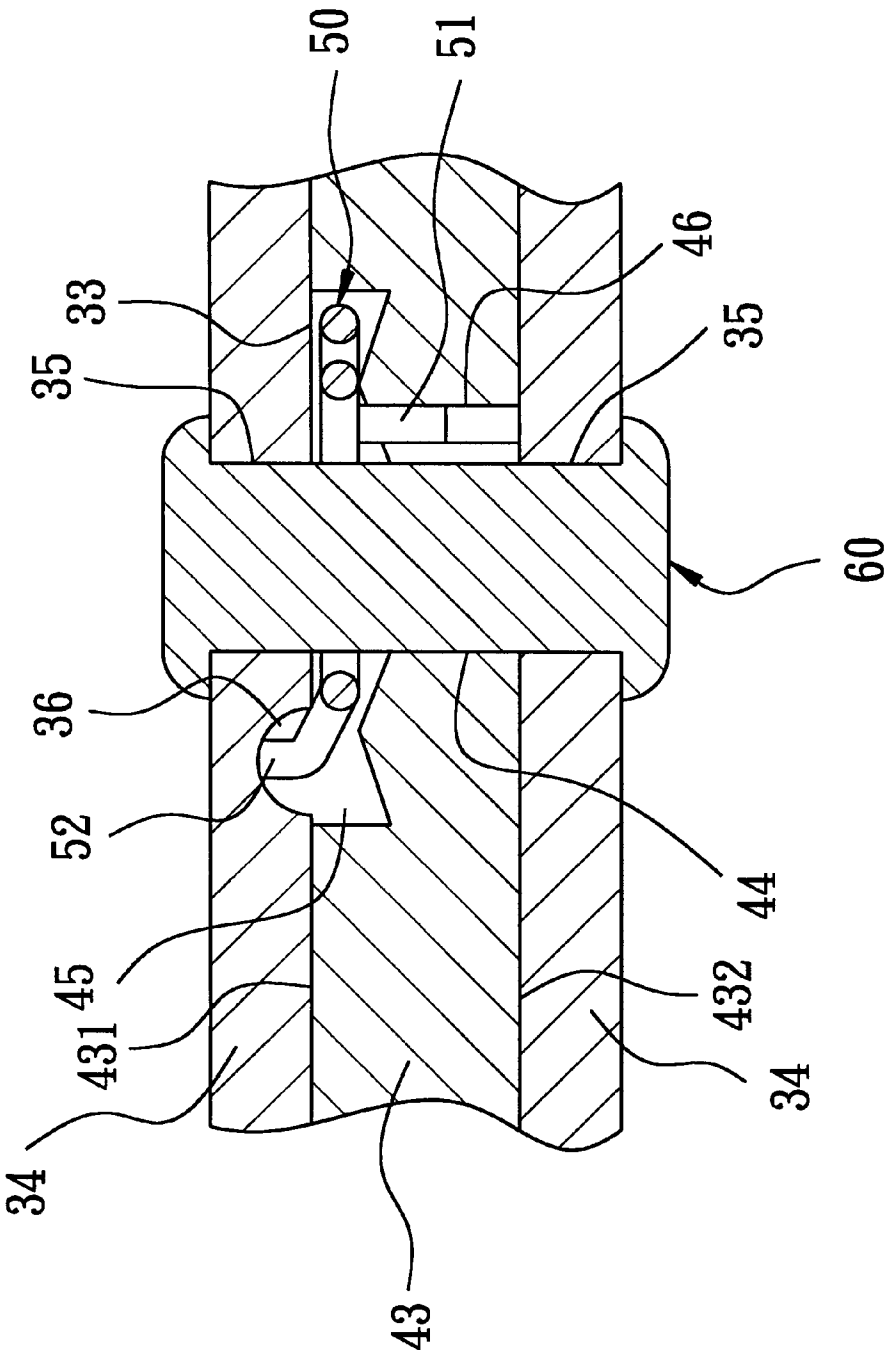

FIG. 8

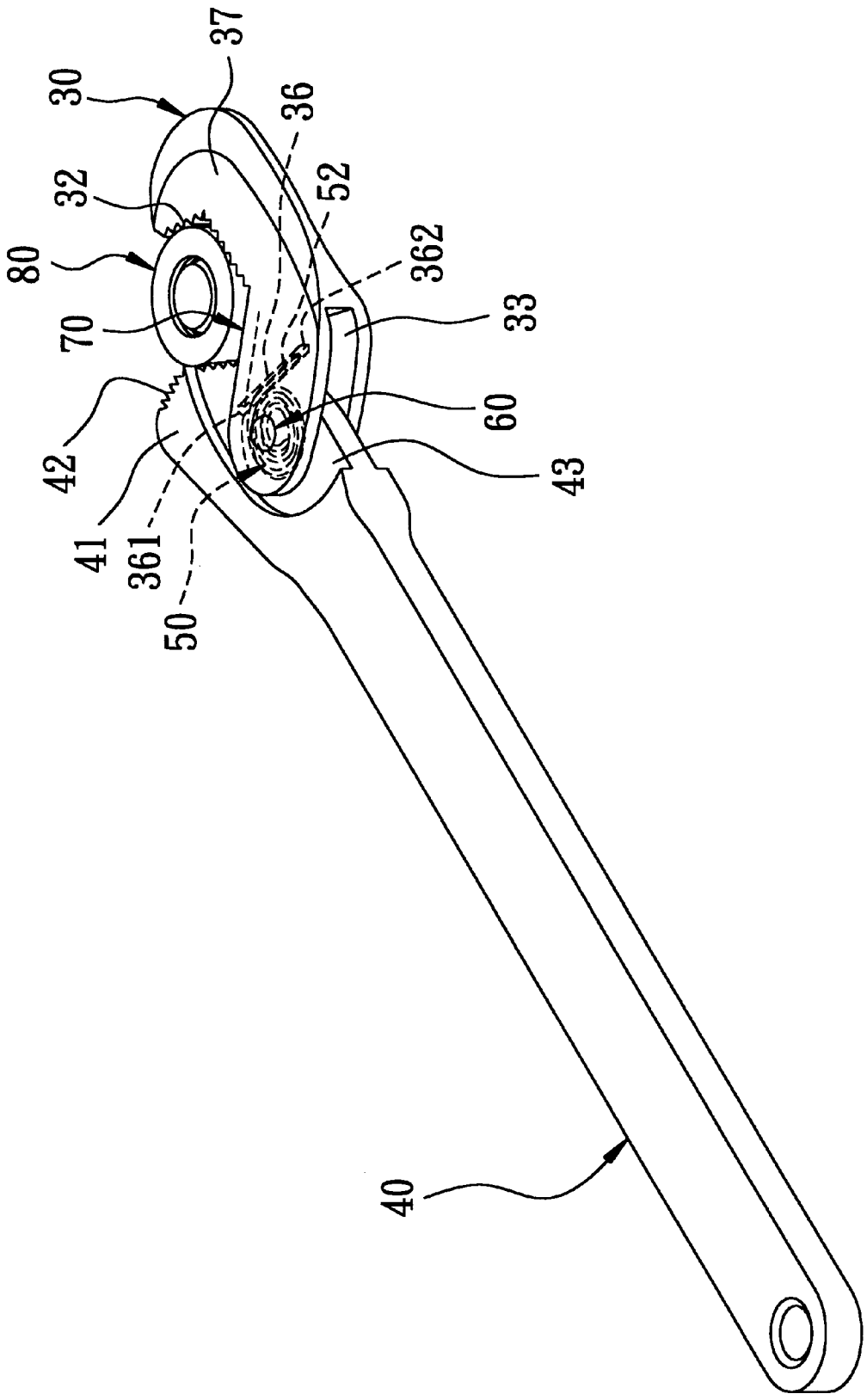

FIG. 9

SPANNER WITH TORSION SPRING

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a spanner, more particularly to a spanner with an enhanced strength and an enhanced clamping effect on a workpiece.

2. Description of the Related Art

FIGS. **1** to **3** illustrate a conventional spanner for operating a workpiece, such as a screw fastener. The spanner is shown to include an elongated first clamping member **10**, a second clamping member **11**, a pivot shaft **14**, and a torsion spring **13**. The first clamping member **10** has a handle portion **12** and a first jaw portion **121** at a front end of the handle portion **12**. The first jaw portion **121** has a toothed first clamping face **122**, and a pivot plate portion **123** with a reduced thickness relative to the handle portion **12**. The pivot plate portion **123** has a first pivot hole **124** formed through top and bottom surfaces thereof, and an insert hole **125** formed in the top surface adjacent to the pivot hole **124**. The second clamping member **11** has a second jaw portion **117** with a toothed second clamping surface **112**, and a pair of spaced-apart pivot lobes **114** extending from the second jaw portion **117** to define an opening **111** with the second jaw portion **117**. The pivot lobes **114** are formed with aligned second pivot holes **115**, and cooperatively define a receiving space **113** to permit extension of the pivot plate portion **123** thereinto so as to align the first pivot hole **124** with the second pivot holes **115**. The pivot shaft **14** extends through the first and second pivot holes **124**, **115** for mounting pivotally the first clamping member **10** on the second clamping member **11**. The second clamping surface **112** confronts the first clamping surface **122**. The torsion spring **13** is sleeved on the pivot shaft **14**, and is disposed between the pivot lobes **114**. The torsion spring **13** has a first leg **131** at one end, and a second leg **132** at the other end. The first leg **131** is inserted into the insert hole **125** for retention at the pivot plate portion **123** of the first clamping member **10**. The second leg **132** extends out of the receiving space **113**, and is retained at a retaining slit **116** formed in an outer surface of the second clamping member **11** adjacent to the receiving space **113**. As shown in FIG. **4**, in use, the second clamping member **11** is moved pivotally about the pivot shaft **14** against the biasing action of the torsion spring **13** so as to move the second jaw portion **117** away from the first jaw portion **121** such that a clamping space **15** is formed between the first and second clamping surfaces **122**, **112** to permit extension of a workpiece **20**, such as a screw fastener, thereinto. The torsion spring **13** biases the second jaw portion **117** toward the first jaw portion **121** such that the workpiece **20** can be clamped tightly between the first and second clamping surfaces **122**, **112**, thereby permitting operation, such as turning, of the workpiece **20** via the spanner.

However, it is noted that the conventional spanner suffers from the following disadvantages:

(1) Since the torsion spring **13** is received in the receiving space **113**, together with the pivot plate portion **123** of the first clamping member **10**, a clearance **16** should be formed between the pivot plate portion **123** and one of the pivot lobes **114** for accommodating the torsion spring **13**. Therefore, the pivot plate portion **123** of the first clamping member **10** should be reduced in thickness. The strength of the pivot plate portion **123** is thus reduced.

(2) As the thickness of the pivot plate portion **123** is reduced, the surface area of the first clamping surface **122** is reduced accordingly, thereby adversely affecting the clamping effect of the spanner on the workpiece **20**.

(3) As the second leg **132** of the torsion spring **13** extends out of the receiving space **113**, it is likely to be moved by an adjacent article when the spanner is operated, thereby affecting operation of the torsion spring **13**.

SUMMARY OF THE INVENTION

Therefore, the object of the present invention is to provide a spanner that is capable of solving the aforementioned problems.

Accordingly, the spanner of the present invention includes an elongated first clamping member, a second clamping member, a pivot shaft, and a torsion spring. The first clamping member has a first jaw portion and a handle portion connected to the first jaw portion. The first jaw portion has a pivot plate portion with top and bottom surfaces and a first pivot hole formed through the top and bottom surfaces. The pivot plate portion of the first clamping member has a thickness measured between the top and bottom surfaces. The second clamping member has a second jaw portion and a pair of pivot lobes connected to the second jaw portion. The pivot lobes cooperatively define a receiving space therebetween to permit the pivot plate portion of the first clamping member to extend thereinto. Each of the pivot lobes is formed with a second pivot hole that is aligned axially with the first pivot hole. Each of the pivot lobes has an inner surface that confronts the other one of said pivot lobes. The receiving space has a width which is measured between the inner surfaces of the pivot lobes. The pivot shaft extends through the first and second pivot holes for mounting pivotally the second clamping member on the first clamping member. The torsion spring is sleeved on the pivot shaft, and is disposed in the receiving space for biasing the second jaw portion of the second clamping member to move toward the first jaw portion of the first clamping member. One of the top and bottom surfaces of the pivot plate portion of the first clamping member is formed with a recess confining wall that defines a recess around the first pivot hole. The torsion spring is received in the recess so as to be concealed by the recess confining wall, and has a first end retained at the first clamping member and a second end retained at the second clamping member. The width of the receiving space of the second clamping member is substantially equal to the thickness of the pivot plate portion of the first clamping member.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

FIG. **1** is an exploded perspective view of a conventional spanner;

FIG. **2** is a schematic side view of the conventional spanner;

FIG. **3** is an enlarged, fragmentary sectional view of the conventional spanner;

FIG. **4** is a fragmentary schematic view illustrating the conventional spanner when in use;

FIG. **5** is an exploded perspective view of a preferred embodiment of a spanner according to the present invention;

FIG. **6** is a perspective view of the preferred embodiment;

FIG. **7** is a schematic side view of the preferred embodiment;

FIG. **8** is a fragmentary sectional view of the preferred embodiment; and

FIG. **9** is a perspective view of the preferred embodiment when in use.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **5** and **6**, the preferred embodiment of a spanner according to the present invention is shown to include an elongated first clamping member **40**, a second clamping member **30**, a pivot shaft **60**, and a torsion spring **50**.

The first clamping member **40** has a handle portion **47** and a first jaw portion **41** formed on one end of the handle portion **47**. The first jaw portion **41** has a toothed end face formed as a first clamping surface **42**, and a pivot plate portion **43** extending from the first clamping surface **42**. The pivot plate portion **43** has top and bottom surfaces **431**, **432**, and a first pivot hole **44** formed through the top and bottom surfaces **431**, **432**. The top surface **431** is formed with an annular recess confining wall **451** that defines a circular recess **45** around the first pivot hole **44**, and an insert hole **46** disposed in the recess **45** and offset from the first pivot hole **44**.

The second clamping member **30** has a second jaw portion **37**, and a pair of spaced-apart pivot lobes **34** which extend from the second jaw portion **37** and which cooperate with the second jaw portion **37** to define a multi-angled opening **31**. The second jaw portion **37** has a toothed and angled face which confronts the opening **31** and which serves as a second clamping surface **32**. The pivot lobes **34** cooperatively define a receiving space **33** therebetween, and are formed with aligned second pivot holes **35**. Each of the pivot lobes **34** has an inner surface which confronts the other one of the pivot lobes **34**. The inner surface of an upper one of the pivot lobes **34** is formed with an elongated retaining groove **36** that extends from a first lateral edge portion **341** of the pivot lobes **34** toward an opposite second lateral edge portion **342** of the pivot lobes **34**. The retaining groove **36** extends along the inner surface of the upper one of the pivot lobes **34**, and has an open end **361** formed at the first lateral edge portion **341** and a closed end **362** opposite to the open end **361**.

The pivot shaft **60** extends through the first and second pivot holes **44**, **35** for mounting pivotally the pivot plate portion **43** of the first clamping member **40** on the pivot lobes **34** of the second clamping member **30** such that the first clamping surface **42** confronts the second clamping surface **32**.

The torsion spring **50** is sleeved around the pivot shaft **60**, and is received in the recess **45** so as to be concealed by the recess confining wall **451** of the pivot plate portion **43** of the first clamping member **40**. The torsion spring **50** has a first end with a first leg member **51** that is inserted into the insert hole **46** in the recess **45** for retention at the pivot plate portion **43** of the first clamping member **40**, and an opposite second end with a second leg member **52** that is received in the retaining groove **36** for retention at the upper pivot lobe **34** of the second clamping member **30**. The torsion spring **50** biases the second jaw portion **37** of the second clamping member **30** to move toward the first jaw portion **41** of the first clamping member **40** so as to move the second clamping surface **32** toward the first clamping surface **42**.

During assembly, the torsion spring **50** is received in the recess **45**, thereby allowing the first leg member **51** to be inserted into the insert hole **46**. At this time, the second leg member **52** extends outwardly of the recess **45** along the top surface **431**, and projects relative to the second clamping surface **42**. Then, the pivot plate portion **43** is inserted into the receiving space **33** in a direction from the first lateral edge portion **341** toward the second lateral edge portion **342** of the pivot lobes **34** so as to align the first pivot hole **44** with the second pivot holes **35**. During the insertion of the pivot plate portion **43** into the receiving space **33**, the second leg member **52** of the torsion spring **50** extends into the retaining groove **36** via the open end **361** of the retaining groove **36** and abuts against the closed end **362**. The second leg member **52** thus guides the insertion of the pivot plate portion **43** into the receiving groove **33**. Thereafter, the pivot shaft **60** is extended through the first and second pivot holes **44**, **35**, and is retained at the pivot lobes **34** by means of a rivet joint. As shown in FIG. **6**, after assembly, a clamping space **70** is formed between the first and second clamping surfaces **42**, **32**.

Referring to FIG. **9**, in use, a pulling force is applied to the second clamping member **30** to cause the second jaw portion **37** to pivot about the pivot shaft **60** in a direction away from the first jaw portion **41** so as to permit a workpiece **80**, such as a screw fastener, to extend into the clamping space **70**. At this time, the torsion spring **50** is wound, and a restoring energy is stored in the torsion spring **50**. The pulling force is released after the workpiece **80** is extended into the clamping space **70**. The second jaw portion **37** thus moves immediately toward the first jaw portion **41** due to the restoring force of the torsion spring **50**. The workpiece **80** can thus be clamped tightly by the first and second clamping surfaces **42**, **32**.

As shown in FIGS. **7** and **8**, since the torsion spring **50** is received in the recess **45**, and since the second leg **52** of the torsion spring **50** can be inserted into the retaining groove **36** via the open end **361** (see FIG. **5**) during assembly, the thickness of the pivot plate portion **43** of the first clamping member **40**, measured between the top and bottom surfaces **431**, **432**, can be increased to be substantially identical to the width of the receiving space **33** measured between the confronting inner surfaces of the pivot lobes **34**. Therefore, the pivot plate portion **43** has an increased strength as compared to the aforementioned conventional spanner.

In addition, because the pivot plate portion **43** has an increased thickness, the surface area of the first clamping surface **42** is increased correspondingly to achieve an enhanced clamping effect.

Moreover, since the second leg member **52** does not extend out of the receiving space **33**, the torsion spring **50** can be isolated from an article disposed adjacent to the spanner. The biasing action of the torsion spring **50** can be ensured.

While the present invention has been described in connection with what is considered the most practical and preferred embodiments, it is understood that this invention is not limited to the disclosed embodiments but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all such modifications and equivalent arrangements.

I claim:

1. A spanner comprising:

an elongated first clamping member having a first jaw portion and a handle portion connected to said first jaw portion, said first jaw portion having a pivot plate portion with top and bottom surfaces and a first pivot hole formed through said top and bottom surfaces, said pivot plate portion having a thickness measured between said top and bottom surfaces;

a second clamping member having a second jaw portion and a pair of pivot lobes connected to said second jaw portion, said pivot lobes cooperatively defining a receiving space therebetween to permit said pivot plate portion of said first claiming member to extend thereinto, each of said pivot lobes being formed with a second pivot hole that is aligned axially with said first pivot hole, each of said pivot lobes having an inner surface that confronts the other one of said pivot lobes, said receiving space having a width which is measured between said inner surfaces of said pivot lobes;

a pivot shaft extending through said first and second pivot holes for mounting pivotally said second claiming member on said first clamping member; and

a torsion spring sleeved on said pivot shaft and disposed in said receiving space for biasing said second jaw portion of said second clamping member to move toward said first jaw portion of said first clamping member;

wherein one of said top and bottom surfaces of said pivot plate portion of said first clamping member is formed with a recess confining wall that defines a recess around said first pivot hole, said torsion spring being received in said recess so as to be concealed by said recess confining wall and having a first end retained at said first clamping member and a second end retained at said second clamping member, the width of said receiving space of said second clamping member being substantially equal to the thickness of said pivot plate portion of said first clamping member; and

wherein said inner surface of a first one of said pivot lobes that confronts said recess is formed with a retaining groove which extends along said inner surface, said second end of said torsion spring having a leg member that is received in said retaining groove for retention at said second clamping member.

2. The spanner according to claim **1**, wherein said first one of said pivot lobes has opposite first and second edge portions formed between inner and outer surfaces of the first one of the pivot lobes, said retaining groove extending from said first edge portion toward said second edge portion and having an open end formed at said first edge portion to permit insertion of said leg member of said second end of said torsion spring into said retaining groove when said pivot plate portion of said first clamping member is extended into said receiving space while said torsion spring is received in said recess.

3. The spanner according to claim **1**, wherein said pivot plate portion of said first clamping member is further formed with an insert hole in said recess, said insert hole being offset from said first pivot hole, said first end of said torsion spring having a leg member which extends into said insert hole for retention at said pivot plate portion of said first clamping member.

* * * * *